

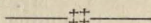
# UNIVERSITY OF CALIFORNIA.

## AGRICULTURAL EXPERIMENT STATION.

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E. W. HILGARD, Director.

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### THE CONSERVATION OF WINES.

In view of the irrational prejudices against the treatment of wines by purely physical means—adding nothing and taking nothing away—that have found expression in various ways during late years, while at the same time other operations involving much deeper changes in the wine, such as fining, sulphuring, addition of tannin, spirits, addition or removal of acid, etc., are freely recommended and practiced (not to speak of less avowable additions), it seems timely to show how the subject of physical wine-treatment is regarded in other countries, especially in those in which the prevalence of climatic conditions similar to ours renders the conservation of dry wines *not* fortified, a matter of well-recognized and acknowledged difficulty. Greece, Italy, Algeria, and South Spain and Portugal have, from this cause, furnished almost none but fortified wines to commerce; only a very careful system of vinification enables Southern (*i. e.*, Mediterranean) France to export some dry wines.

It is idle to pretend that California is or could be exempt from these difficulties, while the vine, olive and orange grow side by side. And so long as the wholesale mode of procedure prevails among our wine-makers, but a few can or will bestow upon their product the care that, under the trying climatic conditions, is alone capable of insuring conservation when perhaps it is to pass the equator twice before reaching the consumer.

While it is right and necessary to discountenance and denounce the use of antiseptics,

whether salicylic, boracic, or sulphurous acids, which are objectionable on the score of health alone, it is puerile, at the very least, to object to such means as in no way add to, or take anything from, the wine, except the noxious organisms and ingredients that are the cause of its danger. The self-constituted guardians of wine-purity on this line simply push the wine-maker and merchant to the utmost temptation to the use of antiseptics, by the ill-advised, illogical and fanatical outcry against the treatment of wine by physical means for its conservation.

Of course, wines known to have been prepared with all due care, *and sufficiently matured*, will hereafter, as heretofore, be capable of safe-keeping and shipment without any preventive treatment.

#### WINE-HEATING OR PASTEURIZING.

The latest work on vinification published in Europe (1889), by Prof. Bersch of Vienna,\* contains the following paragraph on the subject of wine-heating:

"The 'pasteurizing' of wines is thus far the only means known by which the wine can in a short time be carried over the period of dangerous changeableness in which it remains so long as it contains dissolved albuminoids or living organisms. It is also the only operation through which, *without the aid of extraneous additions*, wines can most quickly be brought to the point of maximum development; it is furthermore the most simple and from every point of view unobjectionable method of imparting to

\*It should be remembered that Austria ordinarily stands second on the list of wine-producing countries in the world.



wines such keeping qualities that they may be exposed with absolute safety to prolonged sea-voyages under tropical climates. In view of these facts and of its trifling cost, pasteurizing must be considered as one of the most important operations in the treatment of wines; and the apparatus required for carrying it out properly must be considered indispensable in any winery or cellar working for commercial purposes."

Speaking of diseased wines, the same author says:

"With such wines one of two things must be done: Either to discard them as wines and send them to the vinegar factory or still, or to subject them to a treatment that at one blow puts an end to the disease. The only legitimate means of saving wines that have begun to sicken, is to subject them to the heating process, which kills the ferments and leaves the wine in the condition in which it was at the time of the operation."

The last statement may require modification in favor of the electro-magnetic process devised by Dr. Fraser of San Francisco, so far as the killing of the ferments or "sterilization" is concerned. That both processes, *when properly carried out*, produce a more or less marked effect in the direction of "aging" the wine, is also true. That these changes do not affect injuriously any but the most delicately flavored wines, under the judgment of experts; while among the public at large not one in a hundred will notice anything beyond the fact that the wine is sound and whole, and keeps wonderfully even in half-empty bottles, are points denied chiefly by those who have had no experience in the premises. So long, however, as only wines that have already "gone wrong" are subjected to the process, it will be easy to excite prejudice by finding in them the abnormal tastes they possessed before.

#### DIRECT ELECTRIC TREATMENT OF WINES.

The translation given below of an article from the "*Sicilia Vinicola*" of April 19th, regarding the experiments of Mr. Bernardi with the battery-current passed directly *through* the wine, shows the efforts made in the same direction in a climate very similar to ours. While such treatment as this is much more liable than the electro-magnetic process to alter the natural character of the wine, the results seem to show that even thus, an improvement may be obtained, provided the current is properly governed. In the experiments made in this city, some years ago, much more powerful currents were used and the results were quite unsatisfactory:

Mr. Bernardi experimented on six casks of wine containing six hectoliters (150 gallons) each; three of these contained red and three white wine. One cask of each was pasteurized; two casks were treated by electricity and the two remaining casks were left untreated, for comparison.

The pasteurized wine was compared at the end of a month with the original, and the difference found was as follows:

*Original*.—Cloudy; straw-colored; odor of a new wine; savory to the taste.

*Treated*.—Cloudy; yellowish; delicately perfumed; less savory than the original.

A cask of the same wine was submitted to the action of an electric current furnished by four Bunsen elements (Ruhmkorff model).

The negative conductor was an electric-light carbon cylinder (Siemens) 19.7 inches in length and .79 inch thick; the positive was a strip of platinum 13.8 inches long and 1.6 inches in width, encircling the carbon at a distance of .59 inches.

The amperometer marked a little over .7\*. The battery was kept in action for five days. During the action of the current the wine was kept stirred so that the influence should reach the whole mass.

After 24 hours, samples were taken at intervals, some being examined immediately and others well sealed up for future observation.

The treatment lasted 118 hours and during that time the battery was recharged four times.

Mr. Bernardi then made microscopical examinations, chemical analyses and other observations of the several samples; finally, after a month during which he had racked the three wines, he made the following comparison:

*Original*.—Straw-colored, slightly cloudy, odor of new wine still remains, aging hardly perceptible, taste savory. The microscope showed: absence of ferments, a little organic sediment, shapeless and colorless. After the racking, nearly two litres of turbids were left, the lees being rather heavy, and showing by the microscope a little organic matter and inactive yeast, also crystals of tartrate of lime and potash.

*Electrified wine*.—Straw-colored, slightly cloudy, bouquet and flavor marked, resembling a "*vin de liqueur*," very different from the original and though not disagreeable at first, so marked and peculiar that it soon produces a repugnance. Somewhat aged; microscope showed no ferments only a little shapeless and colorless organic sediment; lees of the same composition as those of the original wine.

*Pasteurized wine*.—Yellowish, clear; some bouquet, but somewhat insipid; perceptibly aged, more pleasing to the palate than the two preceding.

The microscope showed absence of ferments and organic matter. There were nearly two litres of cloudy wine, darker in color than that of the preceding wines (perhaps on account of the solvent action of the warm alcohol on the cellulose), and containing wine yeast and shapeless organic sediment of a dark-yellow tint.

Mr. Bernardi has made the same experiments with red wines, and has arrived at the following general conclusions:

1. "Pasteurizing" and the direct action of the electric current result in a notable aging in both red and white wines.

2. Red wines under the action of electricity acquire, besides a notable aging, a delicate bouquet, provided they are kept in cask for some months after the action of the current; they become also fuller flavored and less coarse, while pasteurizing, though having in a less de-

\*The text gives "7 amperes," but from the dimensions of the battery and the tenor of the conclusions, this must be an erratum.



gree the advantages of electricity, causes a loss of flavor in some wines.

3. White wines submitted to the electric current acquire also a certain degree of age, but odors and tastes are also developed in them which, though not disagreeable in themselves, might be mistaken for artificial additions, and are such that they soon pall on the palate. However, after some months of rest in cask, these odors and tastes become diminished and refined, and it is probable that with a prolonged stay in cask they would disappear completely.

4. Pasteurization, though it ages the wine, has for white wines the disadvantage of diminishing its bouquet. It is to be preferred for white wines, as it communicates no foreign flavor to them.

5. In red and white wines treated by electricity an identical odor is produced, being, however, much less marked and disagreeable in red than in white wines.

6. The larger quantity of ash in the electrified wines and the smaller amount of extractive matter should prove the elimination of albuminoids, and therefore give the wine a better chance of keeping. The keeping of the wine is due, however, also to the antiseptic qualities of the current (action of ozone).

7. The diminution of acid in the heated or electrified wines is due to the formation of ethers (which denotes age), whose presence causes the cream of tartar to be deposited.

8. The increase in alcohol which takes place in young electrified wines preserved in bottle, proves that the action of the current is not dangerous to the alcoholic ferment, which is only arrested in its activity and regains it afterward. It would, therefore, be important to rack the clear wine from the ferments which form part of the lees.

9. A very weak current of electricity must be used, and for a long time.

10. With an apparatus like that of Bernardi the current must be continuous for from 100 to 200 hours.

#### WINE FILTRATION.

The following article on the *Sterilization of Wine by Filtration*, taken from "*Lyon Vini-cole*" of January 19th, conveys a very striking implication that Algerian wine-makers are at least as much troubled as Californians, by a redundancy of ferment germs in their wines, and have to adopt special measures to counteract them:

Since the investigations of Pasteur, Koch, Chautenisse, Vidal and others, on the subject of microbes, many attempts have been made to purify the liquids that contain them and are destined for human consumption. Dr. Chamberland has invented a method of filtration (for water more particularly) through a very porous kind of porcelain, and with the "*bougies*" of his manufacture, excellent results have been obtained.

It has been thought that this same system might be applied to wine, and especially to "sick wine," to rid it of noxious ferments, the germs of the parasites which affect it and are the cause of so many different maladies, acetification, bitterness, milksourness, etc. In this regard certain wines offer a wide field for study, and there has been no lack of experiments.

We now learn that the filtration of wine by

the Chamberland method has passed from the domain of theory to that of practical application. *It is in Algeria, where, on account of the heat, the wines are more susceptible to the various ills, that this method has been put to serious use.\**

Mr. Catta has just published on this subject an interesting study in the "*Bulletin des Viticulteurs d'Algerie*," where he announces the installation of three public "filtreries," at Algiers, Oran and Philippeville; that is, at the vinicultural centers of the three departments of Algeria. He gives a description of the establishment at Algiers; we will follow him in order that our readers may be able to judge of the work.

Chamberland's "*bougies*" are small cylinders of porous porcelain. If we plunge this cylinder into a liquid, as it is closed below and open on top, the liquid will tend to enter the interior cavity by traversing the pores of the porcelain; but the pores are very fine and the penetration will be extremely slow. To make the liquid pass more quickly, it is necessary to exert pressure on its surface outside, or to exhaust the air inside of the cylinder, which will bring about the same result; this object is attained by means of a siphon. If we fix a Chamberland "*bougie*" on the short end of a siphon and then plunge the "*bougie*" thus connected into a vessel containing a liquid we desire to draw out, we have simply to suck on the long end, as is done with an ordinary siphon, and soon the liquid will commence to run, the only difference being that the movement will be slower than if the "*bougie*" were not there. Several "*bougies*" can be attached to one siphon, and will then form what is called a "*battery*." It is through an apparatus of this kind, which may be indefinitely multiplied, that the wine to be purified passes, and is cleansed of the ferments which it contains.

The wine to be filtered is put in vessels placed at as high an elevation as possible, in order to obtain suitable pressure; by its own weight the wine first runs into ordinary filters consisting of screens covered with filtering cloth, where it is freed from the thicker lees which would too quickly choke up the "*bougies*" and retard their action. After this preliminary filtration the wine passes into a vat which is arranged for the purpose of maintaining a constant level in the filtering receptacles where are placed the "*bougies*," and into which the wine next runs. During all these operations the wine is constantly kept out of contact with the air, being, by special arrangements, covered with an atmosphere of carbonic acid gas. The operation can also be stopped for the purpose of cleaning various parts of the apparatus, such as the "*bougies*," faucets, pipes, etc.

This installation is somewhat costly and complicated, but it appears that a large quantity of wine can be purified and sterilized by it. At the "*filtrerie*" of Algiers, each of the vats contains a battery of 500 "*bougies*;" as there are 12 vats, this gives 6000 "*bougies*;" the total fall through the siphons from the level of the wine in the vats to the outlet at the end of the tubes on the ground floor of the building is four meters (13 feet). From experiments made, it is hoped to filter from 300 to 400 hectoliters (7500 to 10,000 gallons) per day. The wine after treatment flows into a large closed vat from which

\*The italics are ours. It may be mentioned here that a "*battery*" of Chamberland filters for experimental purposes has already been ordered by this station.



it is conducted into barrels which have been themselves sterilized by means of steam.

When thus treated and put in casks, the wine is said to be rendered safe from all deterioration as long as fresh germs of maladies are not allowed to enter it or are introduced in subsequent rackings and manipulations. It is possible then to leave such wine in a badly exposed place or to ship it long distances, without risk of its becoming acetified, bitter or milksour, and when it arrives at its destination it can compete honorably with well-made and sound wines.

In closing, Mr. Catta makes the following statement:

"We remember having made last year the following commercial experiment: We passed through a small Chamberland filter in our laboratory part of a wine infested with the filiform microbes of milksourness; we then submitted to one of the most experienced experts of our town a sample of the filtered wine and a sample of the same wine *not* filtered, without, however, giving him any explanation, simply asking him what might be the difference in commercial value between the two samples. Without the slightest hesitation and without suspecting for a moment that he was dealing with the same wine, our expert pronounced the filtered wine to be worth at least five francs more per hectoliter than the other; so much difference was there in limpidity and brilliancy of color. This, however, was a case of a wine

attacked by the filiform microbes. It is beyond doubt that if the wine could have been sterilized as soon as made, and *before* having been attacked by the disease, its value would have been still higher."

This experiment is very interesting; but we would have liked to know more exactly the results regarding the state of the wines before and after treatment in the "filtrerie" established at Algiers. The analysis of the wines submitted to this method of purification would be very useful, for the two successive filtrations in the ordinary filter and through the "bougies" might modify the intensity of color, the alcoholic strength, the quantity of extract, etc. These are, from a commercial point of view, factors which cannot be neglected. More complete information on these subjects is therefore desirable.

The allusion in the above article to "the great heat which makes the wine more susceptible of the various ills," and the anecdote of Mr. Catta in relation to wine infested with the filiform ferment, come home very directly to our winemakers. Would it not be better that they should recognize and grapple with the facts, instead of hiding their heads in the sand of a false security?

E. W. HILGARD.

*Berkeley, June 7, 1890.*